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Abstract:
Subpicosecond ac spin-current pulses are generated optically in GaAs bulk and quantum wells at room temperature and at 90 K through quantum interference between one-photon and two-photon absorptions driven by two phase-locked ultrafast laser pulses that are both circularly polarized. The dynamics of the current pulses are detected optically by monitoring, in real time and in real space, the nanoscale motion of electrons with high-resolution pump probe techniques. The spin polarization of the currents is 0.6±0.1, with peak current densities on the order of 10^2 A/m^2.